

IN THE UNITED STATES DISTRICT COURT

**FOR THE NORTHERN DISTRICT
OF CALIFORNIA**

**ANIBAL RODRIGUEZ, SAL CATALDO,
JULIAN SANTIAGO, and SUSAN LYNN
HARVEY, individually and on behalf of
all other similarly situated,**

Plaintiffs,

V.

GOOGLE LLC,

Defendant.

Case No. 3:20-cv-04688-RS

EXPERT REPORT OF JONATHAN E. HOCHMAN

March 22, 2023

Appendix G

Data Test Procedure and Results

Appendix G: Data Test Procedure and Results

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1 Data Test Procedure

1. With my consultants' help, I have conducted a data testing process to better understand Google's collection and saving of data from WAA-off and sWAA-off users on non-Google apps. I directed my consultants to set up four test devices and generate activity on non-Google apps. The testing occurred during an approximately two-week period in January 2023 (January 13 to 31). Google agreed to collect and produce the data that these devices generated during this time period, To the extent that Google saved this data in certain locations, and to the extent Google located this data using identifiers that Plaintiffs provided to Google. This appendix supplements my main report by providing more information about the testing process and the results. These results provide insight into Google's practice of collecting and saving WAA-off and sWAA-off data at the time the underlying data was generated and produced.

1.1 Devices and Identifiers

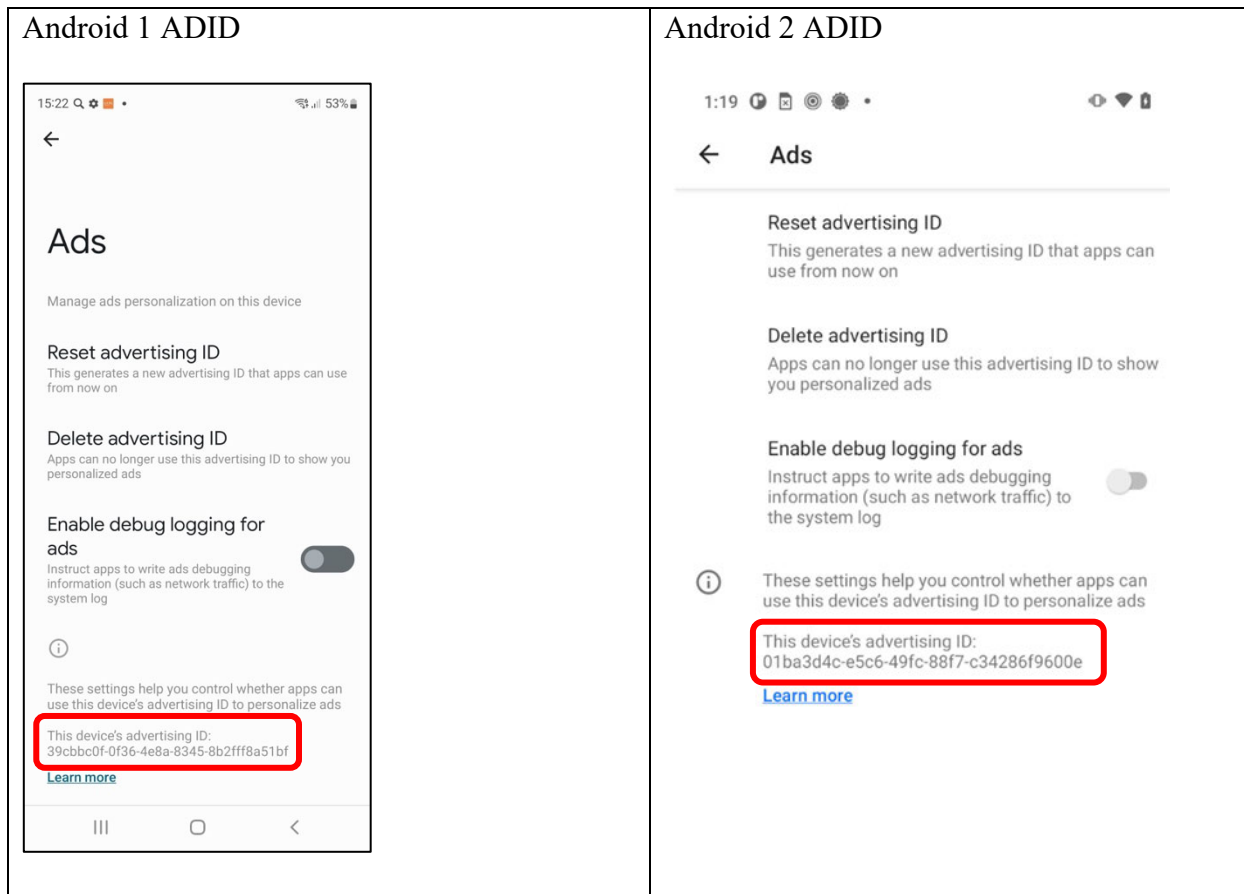
2. The four test devices include two iPhones and two Android phones. The device models and identifiers are listed below. Plaintiffs provided these devices' Device IDs and Google account emails to Google, which agreed to search a small number of its logs using these identifiers and produce the data it locates. The device models and identifiers are listed below.

	Android 1	Android 2	iPhone 1	iPhone 2
Phone Model	Samsung Galaxy S20 (SM-G780G)	Moto G Play	iPhone 14	iPhone 14
Device ID	ADID: 39cbbc0f-0f36-4e8a-8345-8b2fff8a51bf	ADID: 01ba3d4c-e5c6-49fc-88f7-c34286f9600e	IDFA: 1DA6073A-6AD7-4F88-B120-39FC2E6214D3	IDFA: B70E9D3A-4690-40D1-97EE-7D516EFAE5E4
Signed-in Google account	phoenixfire202205@gmail.com	test1.rodriquez@gmail.com	phoenixfire202205@gmail.com	tester.rodriquez@icloud.com

3. Android 1, iPhone 1 and iPhone 2 were primarily located at the same location in California. Android 2 was primarily located in Massachusetts. The Google accounts on each device (identified

above) were created for purposes of this testing process. The ADID and IDFA identifiers were obtained from the test devices. I understand that Google was notified of my team's activities to ensure that we did not breach Google's Terms of Service.

4. On Android devices, the ADID can be found in the Settings app under the Ads (Advertising ID and personalization) setting, as shown in the figures below:



5. There are several ways to obtain the IDFA from iOS devices. For example, one can visit the App Store and download an app that provides the device's IDFA. One such app is called My Device ID by AppsFlyer. One can also obtain the IDFA in the GA4F traffic sent to Google. For example, one can use an HTTP proxy tool to locate the device's IDFA in this traffic; one such

proxy tool is called Charles Proxy.¹ As shown in the figures below, both test iPhones' IDFAs were located using Charles Proxy:

iPhone 1

Charles 4.6.3 - iPhone_p_all_on

File Edit View Proxy Tools Window Help

Code	Method	Host	Path	Start	Duration	Size	Status	Info
204	POST	app-measurement.com	/a	15:19:58	265 ms	2.29 KB	Complete	
204	POST	app-measurement.com	/a	15:21:41	57 ms	2.75 KB	Complete	
204	GET	app-measurement.com	/config/app/1771104868972ios0cecd72a10b7832?app_instance_id=D432A61AA	15:22:03	68 ms	1.77 KB	Complete	
204	POST	app-measurement.com	/a	15:22:03	53 ms	2.34 KB	Complete	
204	POST	app-measurement.com	/a	15:22:11	17 ms	2.35 KB	Complete	
204	POST	app-measurement.com	/a	15:22:12	51 ms	2.27 KB	Complete	
204	POST	app-measurement.com	/a	15:22:34	62 ms	2.42 KB	Complete	
204	GET	app-measurement.com	/config/app/1771104868972ios0cecd72a10b7832?app_instance_id=D432A61AA	16:22:34	130 ms	24.25 KB	Complete	
204	POST	app-measurement.com	/a	16:22:34	81 ms	4.16 KB	Complete	
204	POST	app-measurement.com	/a	16:36:56	80 ms	2.54 KB	Complete	
204	POST	app-measurement.com	/a	16:39:47	68 ms	2.30 KB	Complete	
204	POST	app-measurement.com	/a	16:44:31	81 ms	2.33 KB	Complete	
204	POST	app-measurement.com	/a	16:46:47	54 ms	2.30 KB	Complete	
204	POST	app-measurement.com	/a	16:47:20	72 ms	2.24 KB	Complete	
204	POST	app-measurement.com	/a	16:48:12	68 ms	2.29 KB	Complete	
204	POST	app-measurement.com	/a	17:18:32	83 ms	3.08 KB	Complete	

Filter: app-measurement

Overview Contents Summary Chart Notes

Error parsing message: Protocol message had invalid UTF-8. Check the correct message type has been specified.

```

16: *3.2.07*
17: 90300
18: 90300
19: *12A6077A-6AD7-4F58-B120-39FC264214D3*
20: 0
21: *D432A61AAF4A4C829C1977425B15C50*
23: 46
25: *1:771104868972:ios:0cecd72a10b7832*
26: 1674256906033
30: *e8CBYtA_g0EMxv2b8mREJ*
31: 14
  
```

Headers Text Hex Compressed Form Protobuf Protobuf Text Raw

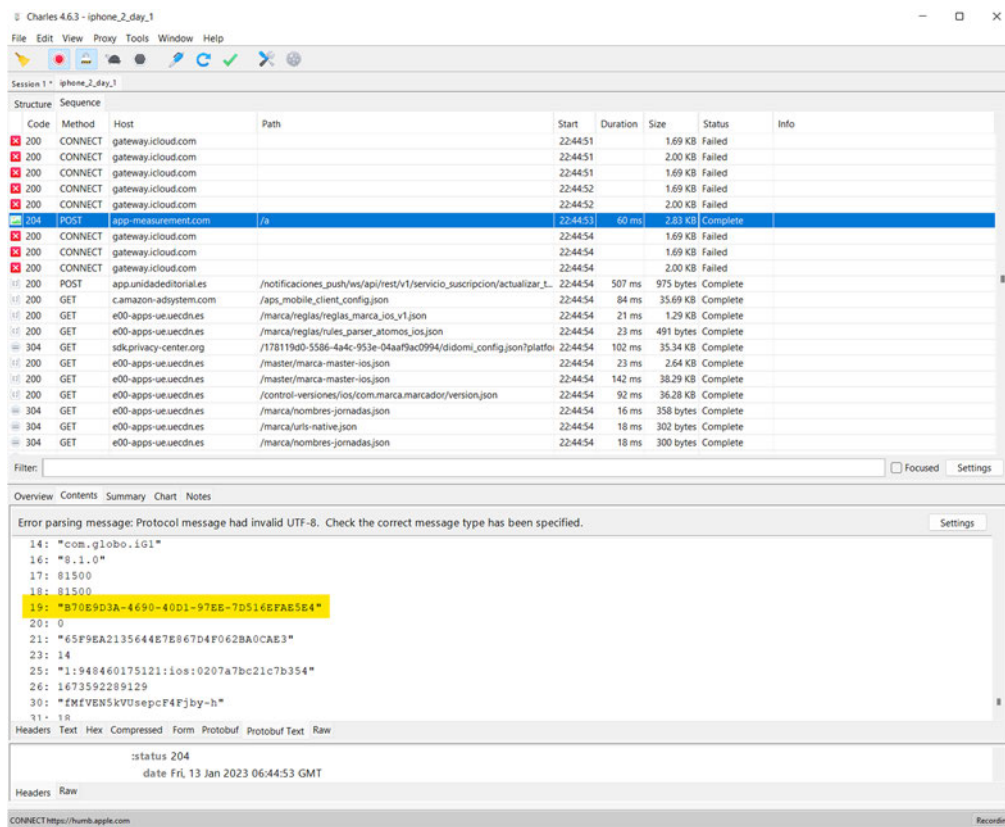
```

status 204
date Fri, 20 Jan 2023 23:22:11 GMT
pragma no-cache
expires Fri, 01 Jan 1990 00:00:00 GMT
cache-control no-cache, no-store, must-revalidate
content-type image/gif
cross-origin-resource-policy cross-origin
  
```

Headers Raw

¹ Charles Web Debugging Proxy Application, Charles, <https://www.charlesproxy.com/> (Last accessed March 20, 2023)

iPhone 2



6. On both Android and iOS devices, GA4F uses HTTPS to transmit data to Google. On iOS, the device can be configured to trust the certificate² used by the capture program allowing my team to decipher the traffic. On Android, root access is required to configure the device to trust the certificate³ and therefore decipher the traffic.

7. I instructed my consultants to root Android 1 while leaving Android 2 unrooted. “Rooting” in the Android ecosystem is the process of gaining privileged (also called root) access to the system. The rooting of the Android 1 device was accomplished using the Magisk⁴ program to generate the

² *Trust Manually Installed Certificate Profiles In iOS And iPadOS*, Apple Support, <https://support.apple.com/en-us/HT204477> (last accessed March 20, 2023)

³ *Adding a Certificate to Android System Trust Store*, Hackers Secrets, <https://medium.com/hackers-secrets/adding-a-certificate-to-android-system-trust-store-ae8ca3519a85> (last accessed March 20, 2023)

⁴ *Magisk Documentation*, Magisk, <https://topjohnwu.github.io/Magisk/> (last accessed March 20, 2023)

rooted system image; samfirm⁵ to obtain a clean system image for rooting; and ODIN⁶ to flash the rooted system image. Step-by-step instructions, provided by Magisk⁷, were followed for this setup. Once rooted, the Android 1 device was configured using HTTP Toolkit for TLS interception.⁸

1.2 App IDs & App Instance IDs from non-Google Apps

8. I also instructed my consultants to obtain GA4F app_instance_ID, Firebase app ID, and IDFV from the test devices. These IDs were obtained from Charles captures for Android 1, iPhone 1 and iPhone 2. The following IDs were submitted to Google for searching, although Google has not made any representations that these IDs were actually used during the data search process.

9. iPhone 1

App Name	App Instance ID	Firebase App ID	IDFV
Globo G1	DA82C5AB9F0842A2B907134DD0C670A1	1:948460175121:ios:0207a7bc21c7b354	
Marca	B9A23A89F0BA4442985DA3CF1F944A4E	1:672805323854:ios:6f30b4c5f0277c56	
Picsart	B1EA416E52B84D1AB077C61AEA8007BC	1:1076413845392:ios:889e98bb9f99c4e2	
NYT	73FCCDA5FB2246838E492600FECB02EE	1:960708863269:ios:96edf9bc5794818b	
Hill Climber	9C8E84CE06D64EBBA3204D54E5CC1382	1:85871959687:ios:90d0082498aa96ba	
Penguin Isle	D88B6AF7A0E84563A2FF9C0F96F165B3	1:734887458787:ios:f787624d7b4ded67bbd2d6	84509C83-46AE-40A4-B6C3-182B9DB190C2
Slidey: Block Puzzle	D432A61AAF4A4C829C19777425B15C50	1:771104868972:ios:0cecdf72a10b7832	84509C83-46AE-40A4-B6C3-182B9DB190C2

⁵ *Jesec/samfirm.js*, Github, <https://github.com/jesec/samfirm.js> (last accessed March 20, 2023)

⁶ *[Tool][Unity][Win] Odin3 v3.14.4*, XDA, <https://forum.xda-developers.com/t/tool-utility-win-odin3-v3-14-4.4108247/> (accessed March 20, 2023)

⁷ *Installation*, Magisk, <https://topjohnwu.github.io/Magisk/install.html> (last accessed March 20, 2023)

⁸ *Intercepting Android HTTP*, HTTP Toolkit, <https://httptoolkit.com/docs/guides/android/> (last accessed March 20, 2023)

10. Android 1

App Name	App Instance ID	Firebase App ID
com.foxnews.android	69c463ee41840f2427a5610d14725eb4	1:577374863204:android:93e9fec05c5981d4
com.fingersoft.hillclimb	1f1b1ef2575c2dd30def6e8d52baf5e8	1:85871959687:android:d3c6e1675d3afffa
com.nytimes.android	5a8203a65078dd3eca30b9ce08817195	1:960708863269:android:ddbc2174fc8d087a
com.picsart.studio	13d0b33b9c63d1eb8cbb711194353f64	1:1076413845392:android:889e98bb9f99c4e2
com.espn.fantasy.lm.football	bf1775f5614ba285706e1648541b2c10	1:630418548665:android:637266297984ff86
com.iphonedroid.marca	71ea3daf19cfa9df8a5e4f18172011c6	1:672805323854:android:0c109c554e39d88b
com.globo.gl.app	c6235b19a0ed3e5c1cd2ca71c68fa379	1:948460175121:android:4de531ce6885940ff296b0
com.nike.omega	1893a99e01ead5aca43ae89f047fcb78	1:293647674073:android:9fc2ffe8b7087dal
com.nordstrom.app	a31bc942d3e5e15c1ef3d00e367646ec	1:681339092820:android:021748ed67d8c079
com.walmart.android	e6552d3ff1073665178a6cf462ffe2c6	1:751207077326:android:9b94cfc0604614a4
com.washingtonpost.android	d560939868058f676e8bf1e89e9fe679	1:790760606928:android:541dded8a6e6bea5
com.amazon.mShop.android.shopping	1c1e02f378372c5ddaf687c83ff0d3d0	1:16912134167:android:c32daf5ed8f761fce6ec52

11. **Android 2:** Only one id (other than GAIA ID and ADID) was submitted for Android 2: Firebase App ID 1:208825278187:android:dfad68dce7f573dad628e. This single Firebase App ID on Android 2 is associated with a test app “com.waa.experiment” that I describe in detail in Appendix I.

12. **iPhone 2:** app_instance_ID, Firebase App ID, and IDfV were not submitted for this device. Thus, any data Google produced from this device was based on querying using either IDFA or GAIA data.

1.3 Test Procedure

13. To observe data collected and saved by Google, I instructed my consultants to toggle the WAA and sWAA settings; a schedule reflecting the times at which these settings were toggled is

listed below in Section 1.3.3. The consultants browsed the apps listed above in Section 1.2 as well as Google apps and other non-Google apps. I instructed the consultants to click on advertisements that appear in non-Google apps as well as visit different app screens, fill out forms, and perform other activities within the apps.

14. Some of the browsing activities on Android 1, iPhone 1, and iPhone 2 were captured by Charles Proxy and HTTP Toolkit, and are included in Exhibit G-2.

15. The browsing activities on Android 2 were captured by an HTTP tool called Fiddler Classic. The captures are included in Exhibit I-10.

1.3.1 Google Account Sign-Ins

16. On Android 1 and Android 2, the consultants signed into their test Google accounts at the device level (in Settings) for the entire duration of the testing process.

17. On iPhone 1 and iPhone 2, the consultants signed into the following Google apps: YouTube, Chrome, Google Maps, Gmail, Google Calendar, and Google (Google's search app) for the entire duration of the testing process.

1.3.2 3P App Sign-Ins

18. I also instructed the consultants to create sign-in profiles with non-Google apps. These apps include g1, Marca, Picsart, and NYTimes for iPhones 1 and 2. Additionally, for the games Penguin Isle, Slidey, and Hill Climb, the consultant was signed in via Apple's Game Center service.

19. On Android 1, signed-in apps included Fox News, NYTimes, Picsart, Fantasy (ESPN), Marca, g1, Nike, Nordstrom, Walmart, Washington Post, Amazon Shopping, and Ulta Beauty. Additionally, for the games Hill Climb Racing and Uno, Android 1 was signed in via Google's Google Play service.

20. The following emails were used as usernames for signing into the non-Google apps along with passwords created for signing into these apps.

App	Device	E-mail account
g1	iPhone 1, Android 1	phoenixfire202205@gmail.com
Marca	iPhone 1, Android 1	phoenixfire202205@gmail.com
Picsart	iPhone 1, Android 1	phoenixfire202205@gmail.com
NYTimes	iPhone 1, Android 1	phoenixfire202205@gmail.com
ESPN Fantasy	Android 1	phoenixfire202205@gmail.com
Fox News	Android 1	phoenixfire202205@gmail.com
Nordstrom	Android 1	phoenixfire202205@gmail.com
Nike	Android 1	phoenixfire202205@gmail.com
Walmart	Android 1	phoenixfire202205@gmail.com
Washington Post	Android 1	phoenixfire202205@gmail.com
Amazon Shopping	Android 1	phoenixfire202205@gmail.com
Ulta Beauty	Android 1	phoenixfire202205@gmail.com
Uno	Android 1	phoenixfire202205@gmail.com
Hill Climber	Android 1	phoenixfire202205@gmail.com
Hill Climber	iPhone 1	phoenixfire202205@gmail.com
Slidey Block	iPhone 1	phoenixfire202205@gmail.com
Penguin Isle	iPhone 1	phoenixfire202205@gmail.com
g1	iPhone 2	tester.rodriquez@icloud.com
Marca	iPhone 2	tester.rodriquez@icloud.com
Picsart	iPhone 2	tester.rodriquez@icloud.com
NYTimes	iPhone 2	tester.rodriquez@icloud.com
Hill Climber	iPhone 2	tester.rodriquez@icloud.com
Slidey Block	iPhone 2	tester.rodriquez@icloud.com
Penguin Isle	iPhone 2	tester.rodriquez@icloud.com

21. Android 2 signed into the app Uno using the email address rodriquez.test1@gmail.com as the user name and a password created for the profile with the Uno app.

1.3.3 WAA and sWAA Settings

22. On February 23, 2023, Google produced records reflecting the WAA and sWAA statuses of the test accounts. These are included in the Appendix A, “Test Accounts” tab. The produced date and time for each setting change appears to be Coordinated Universal Time (UTC) date and time. These records are accurate.

23. For iPhone 2, the WAA and sWAA settings of the signed-in Google account, tester.rodriquez@icloud.com, were turned off for the duration of the testing process (since 2023-01-13 5:04:43).

24. For iPhone 1 and Android 1, the WAA and sWAA settings of the signed-in Google account, phoenixfire202205@gmail.com, were toggled at the following times:

2022-08-11 18:46:45: WAA-on/sWAA-off
 2023-01-17 5:13:01 WAA-on/sWAA-on
 2023-01-21 2:29:54 WAA-off/sWAA-off
 2023-01-24 3:17:27 WAA-on/sWAA-off
 2023-01-24 3:17:35 WAA-on/sWAA-on

25. For Android 2, the WAA and sWAA settings of the signed-in Google account, test1.rodriquez@gmail.com, were toggled at the following times:

2022-12-27 9:23:01 WAA-off/sWAA-off
 2023-01-01 13:14:52 WAA-on/sWAA-off
 2023-01-18 13:51:05 WAA-on/sWAA-on
 2023-01-20 12:46:38 WAA-on/sWAA-off
 2023-01-20 12:46:43 WAA-off/sWAA-off
 2023-01-21 21:14:15 WAA-on/sWAA-off
 2023-01-21 21:14:23 WAA-on/sWAA-on
 2023-01-23 16:21:23 WAA-off/sWAA-off
 2023-01-26 14:18:24 WAA-on/sWAA-off
 2023-01-26 14:18:33 WAA-on/sWAA-on
 2023-01-27 4:22:42 WAA-on/sWAA-off
 2023-01-27 14:29:50 WAA-on/sWAA-on
 2023-01-27 14:29:57 WAA-off/sWAA-off
 2023-01-28 22:56:58 WAA-on/sWAA-off
 2023-01-28 22:57:04 WAA-on/sWAA-on
 2023-01-29 17:53:51 WAA-off/sWAA-off
 2023-01-31 14:18:06 WAA-on/sWAA-off
 2023-01-31 14:18:23 WAA-on/sWAA-on
 2023-02-01 13:11:58 WAA-off/sWAA-off

2 Google's Data Productions

26. Google produced test data over several productions. On January 20 and January 31, 2023, Google produced analytics data from a collection log. On February 23, 2023, Google produced

analytics data from a downstream Baseview store. On the same day, Google also produced ads data related to conversions from [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] and [REDACTED] [REDACTED].” In addition, Google produced GAIA [REDACTED] data on February 23, 2023. On March 15, 2023, Google made a supplemental UUAD production in a different data format. The only field schema and descriptions Google produced that partially match the fields in the produced Analytics collection log was GOOG-RDGZ-00071768. Google did not provide field schema nor field descriptions for any of the other logs from which data was produced.

27. Previously, Google also made productions of several named Plaintiffs’ data, which I discuss in this Appendix as well. The devices and identifiers for the named Plaintiffs are listed in Section VII.B of the main report and in the “User device IDs” tab in each of the Appendices associated with data analysis.

2.1 GA4F Data in [REDACTED]

2.1.1 January 20, 2023 Production

28. On January 20, 2023, Google produced a first set of test data in GOOG-RDGZ-00208333. Google represented that the production is from a single GA4F log ([REDACTED])

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

29. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

30.

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

31.

[REDACTED]

[REDACTED] || [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

⁹ Decoding can be done through <https://www.base64decode.org>, for example. *Decode From Base64 Format*, Base64 Decode and Encode, <https://www.base64decode.org> (Last accessed March 20, 2023)

32. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

33. From the event time stamps (in comparison with the WAA/sWAA status in Appendix A), I have included the WAA and sWAA status based on “[REDACTED]” I have included the WAA and sWAA status based on [REDACTED] “True” means the setting is turned ON and “FALSE” means the setting is turned OFF. As mentioned, [REDACTED] [REDACTED]. For that record, the WAA/sWAA status are shown as “UNDETERMINED.” For three of the four events with 2022 [REDACTED] [REDACTED]

¹⁰ In Excel, time conversion can be obtained using a formula: =TimeUsec/86400000000+DATE(1970,1,1).

[REDACTED] These mismatches demonstrate that Google's practice of collecting and saving some events after they occur has serious consequences: The user's WAA and sWAA status should be determined at the time of the activity. Google, however, checks WAA and sWAA settings at the time of collection. The user may have changed their WAA or sWAA status between the time of the activity and the time that Google collects and saves associated data. As a result, Google may collect and save data regarding WAA-off and sWAA-off activity to the user's GAIA logs.

34. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

35. The produced data also contains GA4F data from the other three test devices that was generated while WAA and sWAA were turned on. Based on Google's descriptions of the logging structure in its Fourth Supplemental Response to Interrogatory No. 1 and the later production on

January 31, 2023, I would expect a copy of the same data to be stored in GAIA logs; however, Google has not produced data from GAIA logs that correspond to the events in the non-GAIA logs produced on January 20, 2023.

36.

[REDACTED]

37.

[REDACTED]

[REDACTED]

38.

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

40. [REDACTED]
[REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED]
[REDACTED]
[REDACTED]

41. [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

[REDACTED]

42. [REDACTED]
[REDACTED]
[REDACTED]

[REDACTED]

43. [REDACTED]

[REDACTED]

[REDACTED]

44. [REDACTED]

[REDACTED]

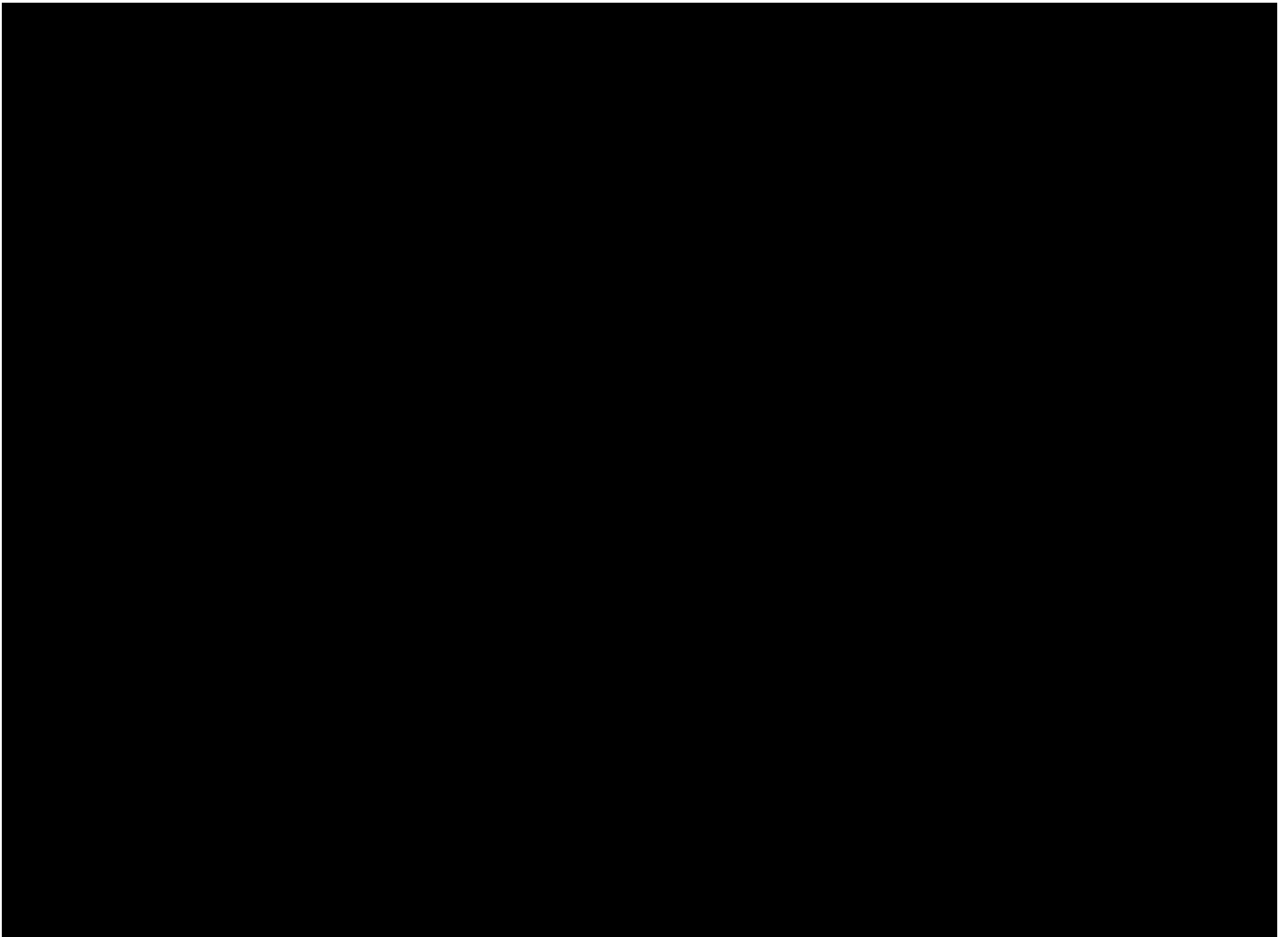
[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED]

[REDACTED]



45.

[Redacted]

[Redacted]

[Redacted]

[REDACTED]

46. [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

47. [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

48.

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

49.

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

51. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

52. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

53. Notably missing from Google's production on January 20, 2023 is

[REDACTED]

[REDACTED]

[REDACTED].

[REDACTED]

54. [REDACTED] (not in the produced schema GOOG-RDGZ-00071768):

While Google continues to use the collected IP address for geo location determination, [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

¹¹ *Prepare ForThe Future With Google Analytics 4*, Google Marketing Platform, <https://blog.google/products/marketingplatform/analytics/prepare-for-future-with-google-analytics-4/> (Last accessed January 15, 2023).

[REDACTED]

[REDACTED]

55. The records produced by Google also [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

56. Google also produced [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

57. [REDACTED] (not in the produced schema GOOG-RDGZ-00071768): Finally, Google's production [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

58. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

2.1.2 January 31, 2023 Production

59. On January 31, 2023, Google produced a second set of test data in GOOG-RDGZ-00208334. This production consists of data from so-called [REDACTED]

[REDACTED] In this section, I will describe the content contained in this production as well as numerous deficiencies with Google's production.

60. As with the January 20, 2023 production, this second production contains GA4F data from the four test devices. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED].

61. I have performed the same data analysis as I did for the January 20, 2023 production and determined the WAA and sWAA status of each produced hit bundle. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED].”

62. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] n [REDACTED]

[REDACTED]

63. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

64. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

65. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED]

[REDACTED]

[REDACTED]

66. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

67. I was able to locate matching records between GAIA and non-GAIA logs using just the stored [REDACTED] across the records. These matching records are shown in

[REDACTED]

[REDACTED]

[REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED]

[REDACTED] [REDACTED] [REDACTED]

[REDACTED]

[REDACTED]

¹² See e.g., Google's 4th Supp. Resp. to Interrog. No. 1, Section 4.

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

69. While Google claims that it does not store non-GAIA identifiers in GAIA logs and GAIA IDs in non-GAIA logs, the voluminous duplicate data it does store in both logs makes record matching straightforward even without these identifiers. Note also that it is unnecessary to match all records. For each user, it is sufficient to form a single match between GAIA and non-GAIA data to link the GAIA ID to all non-GAIA records containing the same identifiers as the matched event.

70. Note that the GAIA data contain [REDACTED] which are described in GOOG-RDGZ-00071768 [REDACTED]. The [REDACTED]

[REDACTED]

field_name	field_type	Field Descriptions
privacy_modifiers	uint64	A bit-vector that describes the set of privacy modifiers that are effective. It can be a combination of DNT, COPPA, LAT, TFCD and etc
user_controls	uint64	A bit-vector that describes the set of user controls that are active. These include the state of the NAC, sWAA and GAP.

71. This is also explained in GOOG-RDGZ-00030007 at -011.R and 012.R, shown below. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

72. On February 7, 2023, in response to the Plaintiffs’ question about the [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

(February 7, 2023 Email: Subject: RE: Rodriguez v. Google)

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED]

[REDACTED] [REDACTED]

[REDACTED]

[REDACTED]

2.2 February 23, 2023 Production from Test Devices and Prior Produced Plaintiffs' Data

73. On February 23, 2023, Google produced additional test data. This production includes Analytics Baseview records, [REDACTED] On March 15, 2023, Google supplemented its [REDACTED] with what it represented as containing “the same information produced on February 23, 2023 but in a different format” (Mar. 15, 2023 Email from A. Flórez, Re: Rodriguez v. Google, Case No. 3:20-CV-04688 (N.D. Cal.) - document production (PROD084)). Previously, Google produced Plaintiffs’ data from the first three of these sources (i.e., from all except for adevents). The below analysis includes both the named Plaintiffs’ data and the test data since there is no difference between how Plaintiffs’ data is stored and how test data is stored.

¹³ For example, by using <https://www.rapidtables.com/convert/number/decimal-to-binary.html>.

2.2.1 Baseview

74. The Baseview production on February 23, 2020³ consists of a .json (JavaScript Object Notation) file with 29,507 events. Each event appears to be data for a single GA4F analytics hit event and contains numerous fields and values. I have extracted a subset of the produced Baseview fields and values in Appendix B.3, “2023-02-23 Baseview” tab. The “date” column shows that the data spans January 13, 2023 to January 27, 2023. The more comprehensive Baseview data covering the full range of dates and containing more hit bundles¹⁴ indicates to me that the [REDACTED] production is incomplete.

75. I have also included a “2023-02-23 App and Instance IDs” tab that lists the unique apps, `firebase_app_id` and `app_instance_id` for each device in the produced data. As can be observed, each app on each device is associated with a unique `app_instance_id`. The `firebase_app_id` uniquely identifies each app, but is not unique for each instance of the app on different devices.

76. Within the “2023-02-23 App and Instance IDs” tab in Appendix B.3, I have highlighted in green ID values that were provided to Google for the data testing process. As can be observed, from ADID and IDFA, Google produced data for apps for which we submitted app IDs and app instance IDs and for other apps for which we did not submit such IDs. This supports my understanding that ADID and IDFA track users across multiple apps on a device. While Google can produce data associated with ADID and IDFA, because Google stores `app_instance_id` and because these IDs are also unique to each device (just like ADID and IDFA), these IDs can similarly be used to locate a particular user’s data on a particular device.

77. The produced Baseview data also contains a `user_id` field. I have included unique `user_id` values in the “2023-02-23 User IDs” tab. This stored `user_id` appears to be unique to each app on

¹⁴ For example, for the app “com.fantome.penguinsisle” on iPhone 1, hit bundles 6 to 39 appear in the produced Baseview data but not in the produced “tmpapp_measurement” data.

each device. In this way, this user_id is similar to app_instance_id in that it can uniquely identify a particular user's data on a particular device.

78. Previously, Google produced Baseview data from Plaintiffs' devices as well. I have performed similar analyses on data from those productions. The respective values and analyses from those productions are in Appendices B.1 and B.2.

79. For the first tab in each of these Appendices, I have included an event index in Column A and the user or device in Column B based on the ADID/IDFA in [REDACTED]. The stored ADID and IDFA are in unencrypted form.

80. Since each bundle is associated with multiple time stamps, I examined the user's WAA and sWAA status based on different time stamps. Google did not provide any explanation as to what each timestamp represents. First, there is a [REDACTED] which appears to match the [REDACTED] timestamp in [REDACTED]. I included the WAA/sWAA status of the user based on this time stamp in Columns E and F. In these columns, "TRUE" means the setting is turned on and "FALSE" means the setting is turned off. Google also stores an "event_timestamp" field. I included the WAA and sWAA status of the user based on this time stamp in Columns C and D. For this set of data, the WAA statuses in Column C match those in Column E. Similarly, the sWAA statuses in Column D match those in Column F.

81. As can be observed, regardless of the user's WAA and sWAA status (i.e., WAA-on, sWAA-on; WAA-on, sWAA-off; or WAA-off, sWAA-off), Google collects and saves GA4F event data in non-GAIA GA4F logs associated with device IDs that Google saves and uses. The types of stored data are the same regardless of these user settings.

82. I have included additional analyses of the produced Baseview data in the main report, Section VII.B.2.c.

2.2.2 [REDACTED]

83. The [REDACTED]” production on February 23, 2023 consists of a spreadsheet with 1512 rows of data from the four test devices. Each row contains a conversion event associated with a particular device ID (ADID/IDFA). The raw produced data is included in in Appendix C, “2023-02-23 prod.” The produced data format is the same as a prior Plaintiff data production in GOOG-RDGZ-00182689. The raw produced data from the Plaintiffs in the “GOOG-RDGZ-00182689” tab, and all of the produced events are merged into the “Combined Records” tab.

84. From the device IDs stored in unencrypted form within the [REDACTED] field, it is readily apparent whose data each row belongs to (*see* “User device IDs” tab). A row index was added to column A of the “Combined Records” tab, and the user and device associated with each event was added to Column C of the same tab. Google did not explain why Plaintiffs Sal Cataldo and Susan Harvey’s data were not produced from this log. Since Google did not provide the script that Google used to search for the Plaintiffs’ data, I could not verify why data was not located for these two Plaintiffs.

85. In addition to device IDs, the conversion data in each row is also associated with a timestamp [REDACTED]” which I used to determine the WAA and sWAA status for each associated account used to sign into each device (“WAA sWAA Status Analysis” tab, Columns G and H) based on the timestamps in Appendix A. The WAA and sWAA status for each event is shown in Column I in the “WAA sWAA Status Analysis” tab in Appendix C. As can be observed, regardless of the user’s WAA status (i.e., WAA-on, sWAA-on; WAA-on, sWAA-off; WAA-off, sWAA-off), Google collects and saves GA4F event data in non-GAIA logs associated with device IDs that Google saves and uses.

86. [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

2.2.3 [REDACTED]

87. [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

88. [REDACTED]
[REDACTED]
[REDACTED]

89. [REDACTED]
[REDACTED]
[REDACTED]

90. [REDACTED]
[REDACTED]

91. [REDACTED]
[REDACTED]
[REDACTED]

[REDACTED]

92. Next, I compared the stored timestamps against the WAA and sWAA status of each event based on the timestamps in Appendix A. The WAA and sWAA status of each event are noted in Columns D and E.

93. Notably, the produced data shows [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

94. Regardless of the user's WAA status (i.e., WAA-on, sWAA-on; WAA-on, sWAA-off; WAA-off, sWAA-off), Google saves events from the same device with the same IP address and device information in user agent, identifying users associated with events that were not stored with GAIA ID.

95. Furthermore, some of the events also contain "[REDACTED]"

[REDACTED]

[REDACTED]

¹⁵ Google stores IPv4 in integer format, which can be converted to IPv4 format. For example, by using <https://www.browserling.com/tools/dec-to-ip>. I included converted IPv4 in Column J corresponding to the integer value in the "client ips" field. *Convert An Integer To An IP Address*, Browserling, <https://www.browserling.com/tools/dec-to-ip> (last accessed March 20, 2023)

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

96. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

2.2.4 [REDACTED]

97. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] As mentioned earlier, on March 15, 2023, Google supplemented the production with 12 text files with Bates number GOOG-RDGZ-00210491 to GOOG-RDGZ-00211103.

98. The [REDACTED] produced on February 23, 2023 was reformatted and combined with prior produced Plaintiffs' data (shown in the "GOOG-RDGZ-00182721" tab) in the "[REDACTED]"

[REDACTED]

produced on March 15, 2023 to this tab. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

99. Each event also records a time stamp (Column L). I compared these time stamps against the WAA and sWAA status of each event based on the timestamps in Appendix A. The WAA and sWAA status of each event are noted in Columns Q and R. The GAIA ID and the User email signed into on each device are shown in Columns O and P.

100. As can be observed from Columns Q and R regardless of the user's WAA and sWAA status (i.e., WAA-on, sWAA-on; WAA-on, sWAA-off; WAA-off, sWAA-off), Google collects and saves event data in [REDACTED], associated with ADID or IDFA. Google stores the data in the same way regardless of WAA or sWAA settings.

101. There are three produced events associated with GAIA IDs. All three events were from Android 2 browsing the non-Google app Ulta generated while the user had WAA and sWAA on.

3 Captured 3P App Traffic Sent to Google

102. In this section, I show sample data from Android 1, iPhone 1, and iPhone 2, captured using Charles Proxy and HTTP Toolkit.¹⁶ These tools intercepted and decrypted GA4F and advertising data sent to Google from Google code embedded in non-Google apps. Google then produced data from its internal data sources that contain data relating to user activity on non-Google apps. The produced data matches the data observed being sent to Google, with Google storing what was received as well as processed data derived from the received user data.

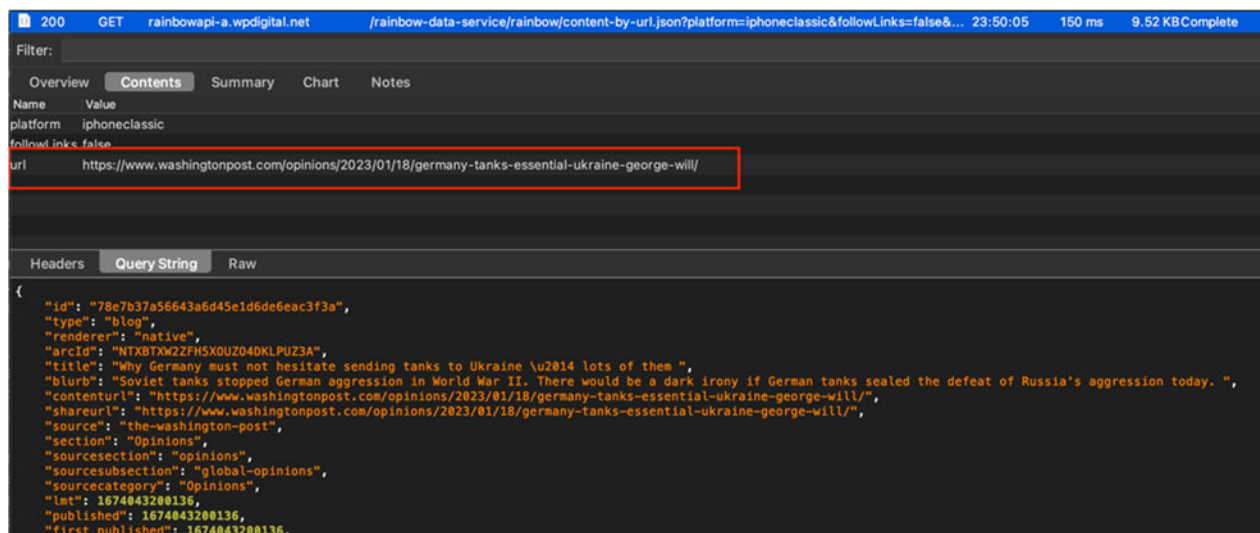
103. Google has not produced data from ads logs that contain non-GAIA ads data, such as ad requests and views. The non-GAIA ads-related data Google produced relates to conversions from GA4F. Google also produced some GAIA ads data, but not non-GAIA. I show sample data captured from the test devices and discuss the type of data in the data captures. I expect this data to be stored in Google ads logs.

3.1 Analytics

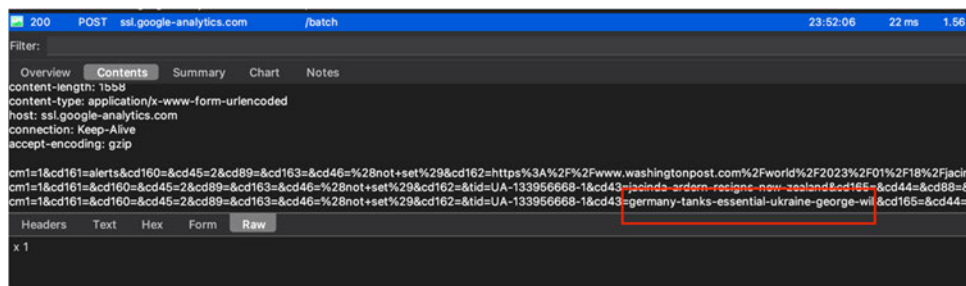
3.1.1 Android 1

104. GA4F collects data transmitted to non-Google app publishers' servers. As a specific example, when browsing the Washington Post App on an Android device, the application requests the URL as shown in the following screen shot:

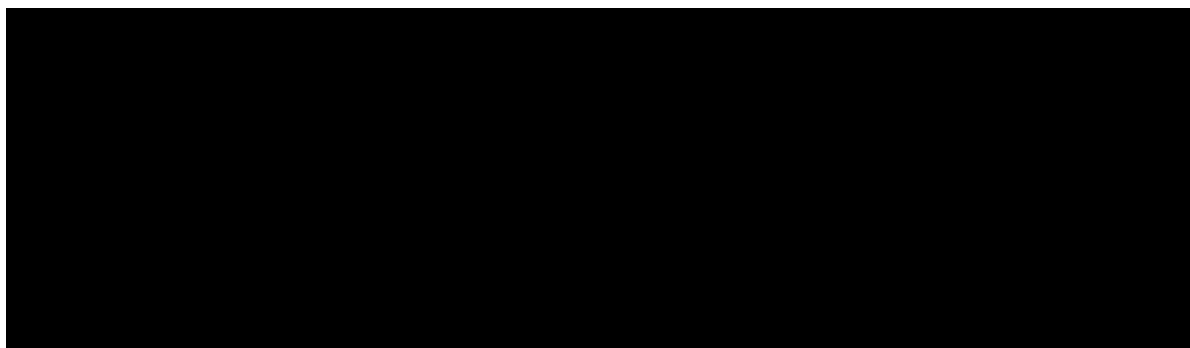
¹⁶ *Intercept & View All Your HTTP(S) Mock Endpoints or Entire Servers Rewrite, Redirect, or Inject Errors*, HTTP Toolkit, <https://httptoolkit.com/> (Last accessed March 20, 2023)



105. In the above screen shot from Charles Proxy, the URL is transmitted to the Washington Post servers (rainbowapi-a.wpdigital.net) and more information is returned about the content to be displayed to the user. This same content is transmitted to Google as shown in the following screenshot:

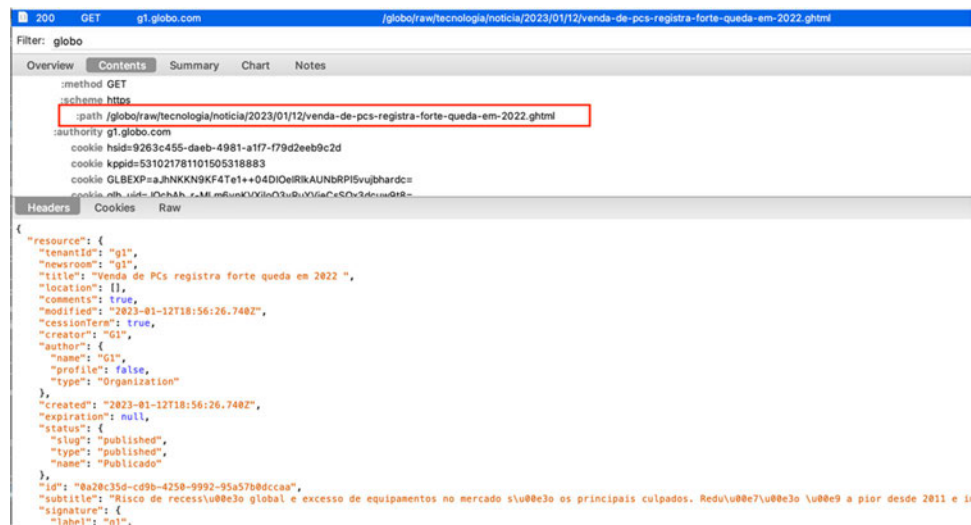


106. This data was then produced by Google, including as shown in Exhibit G-1 and excerpted in the following screen shot:

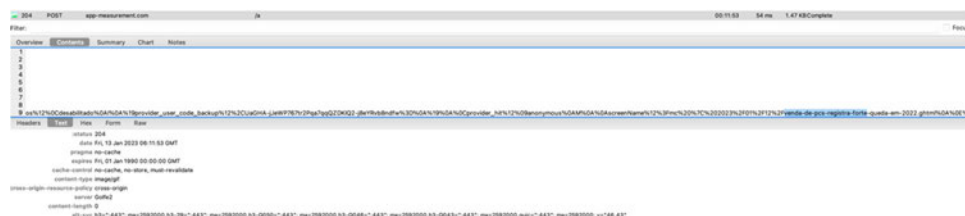


3.1.2 iPhone 2

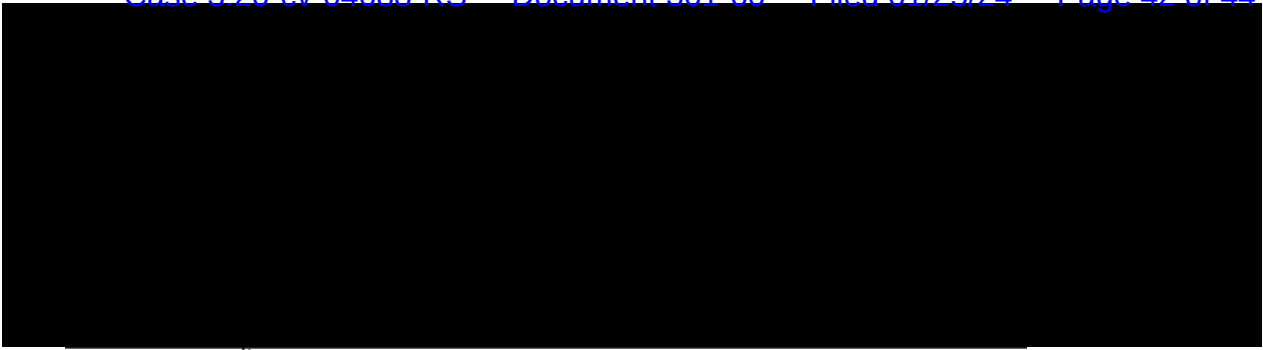
107. Similar to the Android environment, Google Analytics for Firebase collects data transmitted to non-Google app publishers' servers from iOS devices. As a specific example, when browsing the Globo App on an iOS device, the application requests content by URL as shown in the following screen shot:



108. In the above screen shot from Charles Proxy, the URL is transmitted to the Globo servers (g1.globo.com) and more information is returned about the content to display. This same content is transmitted to Google as shown in the following screen shot:



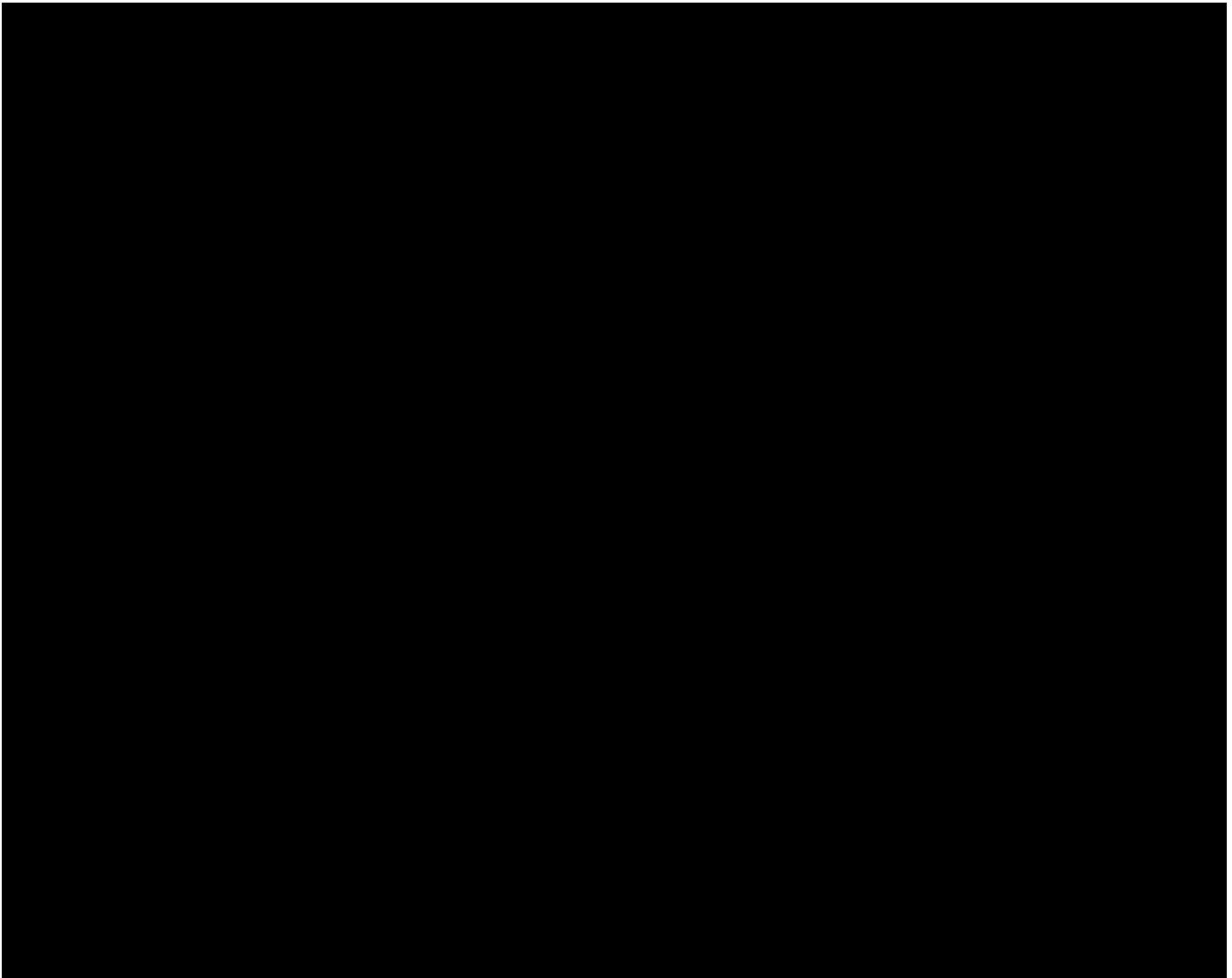
109. This data was then produced by Google, including as shown in Exhibit G-1 and excerpted in the following screen shot:



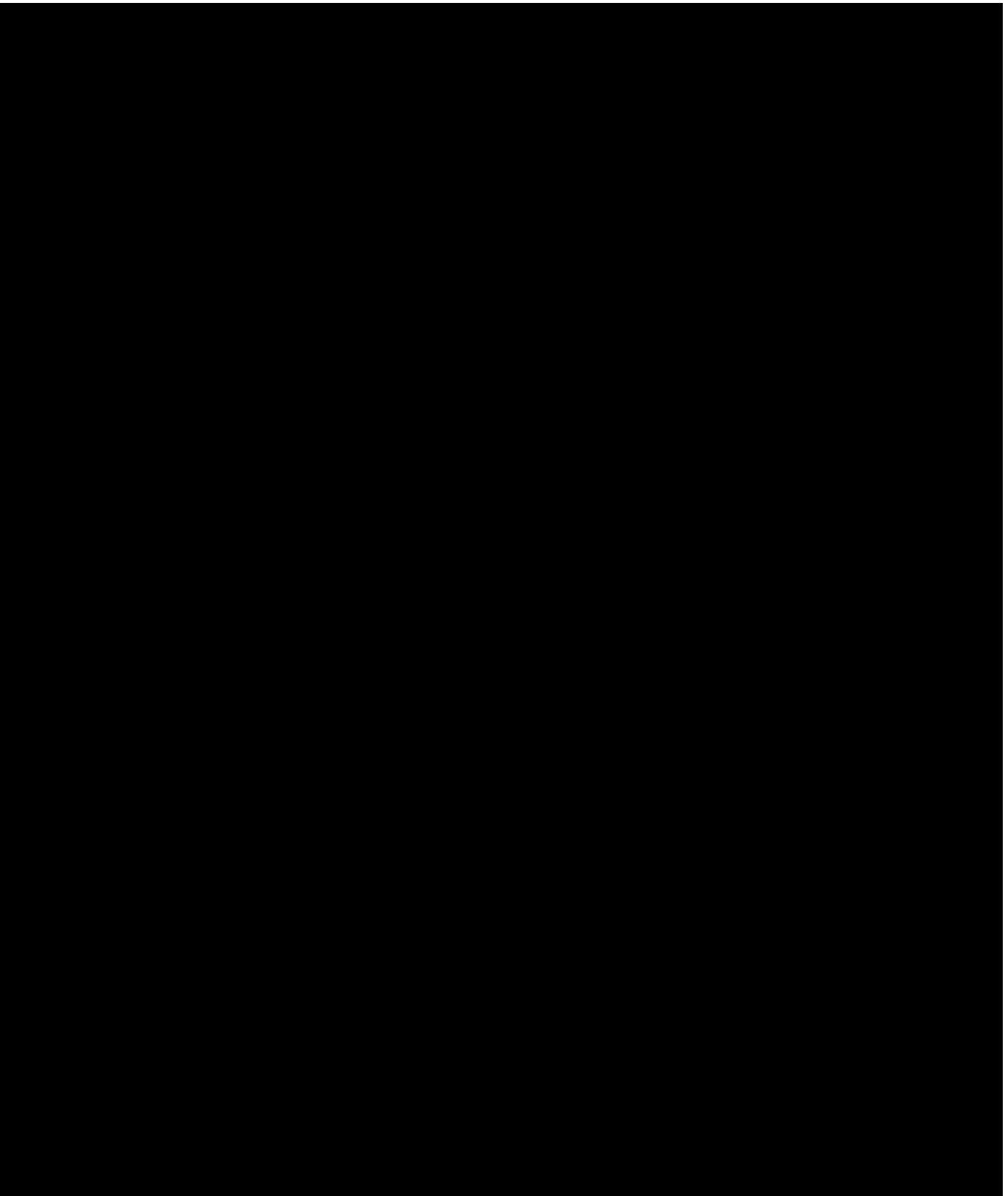
3.2 Ads

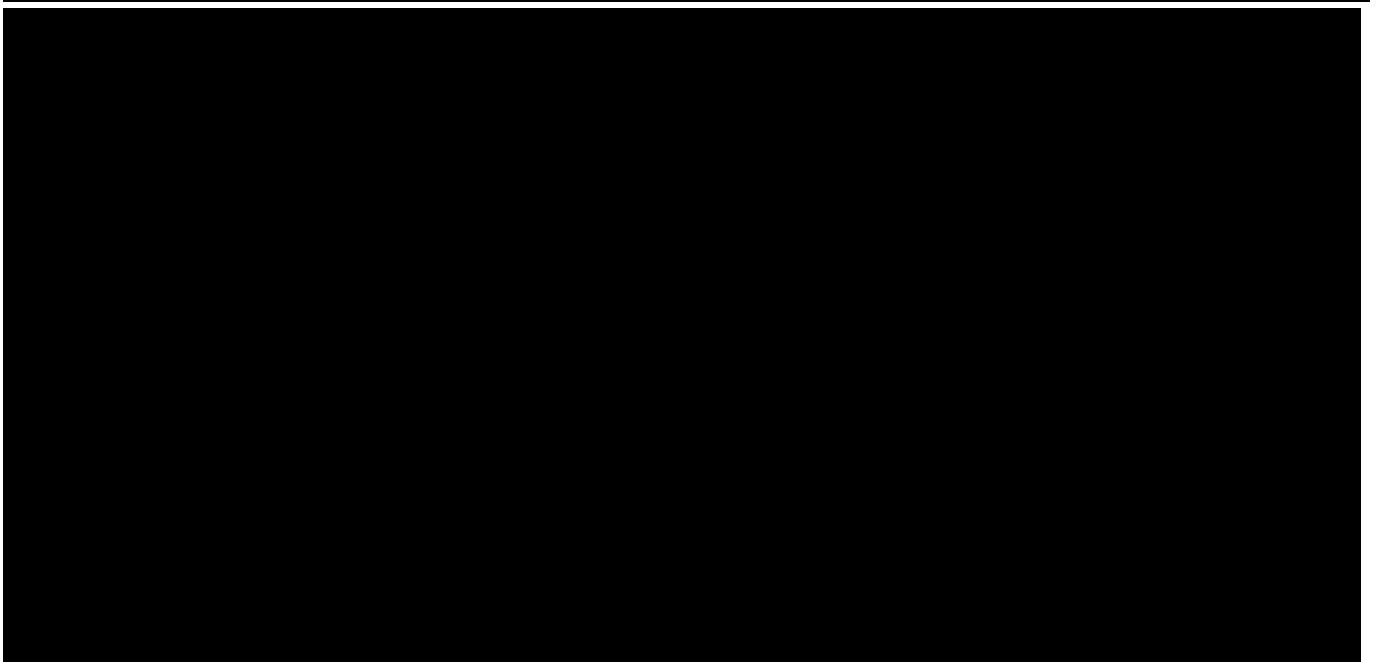
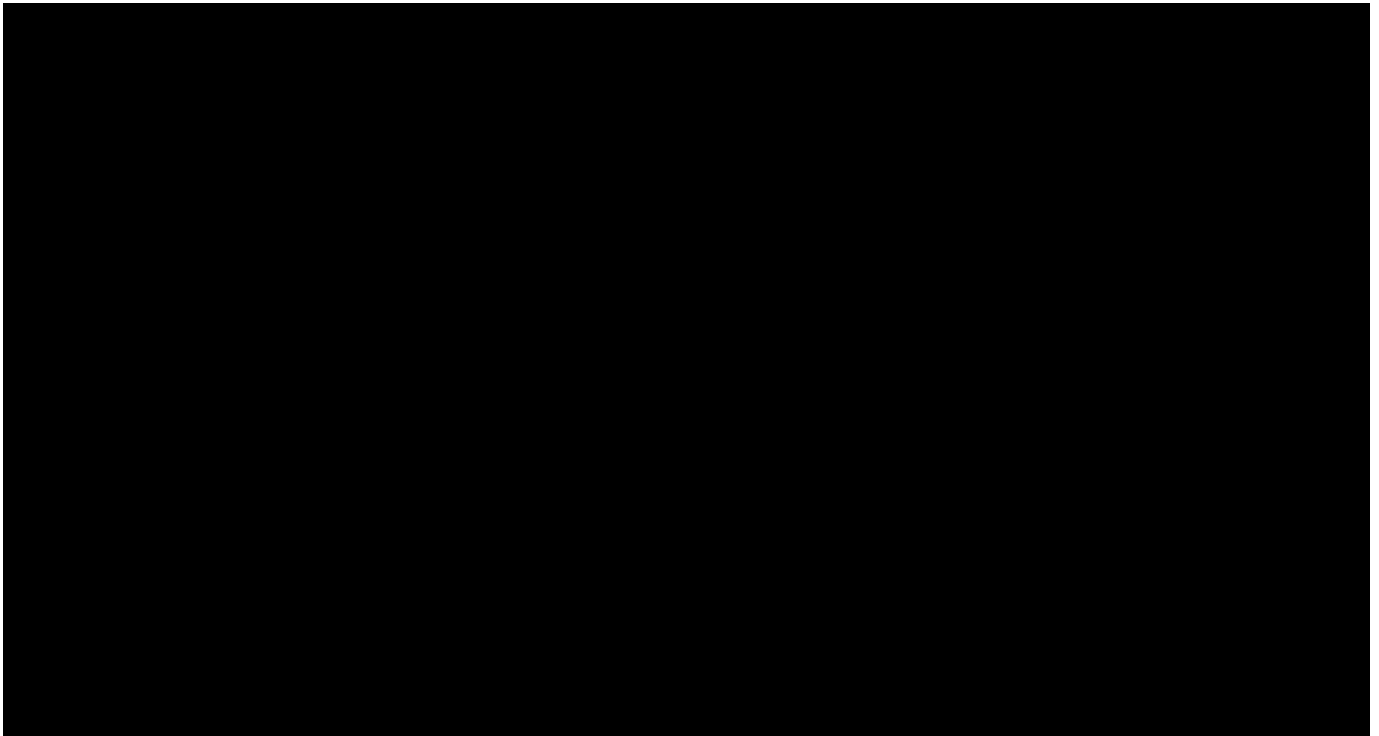
3.2.1 Android 1

110. By way of the GMA SDK, AdMob and Ad Manager collect data transmitted to non-Google app publishers' servers. As a specific example, reproduced within Exhibit G-1, when browsing the New York Times app on an Android device, the following fields were transmitted to Google within a single request:



114. As a second example, reproduced entirely in Exhibit G-1, the following fields are transmitted to Google when using the Globo app:





3.2.2 iPhone 2

122. By way of the GMA SDK, AdMob and Ad Manager collect data transmitted to non-Google app publishers' servers. As a specific example reproduced entirely within Exhibit G-1, when browsing the Marca App on an iOS device, the following fields were transmitted to Google within a single request: